IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

DEBORAH FRANCES MIELEWSKI ET AL.

Group Art Unit: 1711

Examiner: Thao T. Tran

Serial No. 09/748,669

Filed: December 22, 2000

For: SYSTEM AND METHOD OF PREPARING A REINFORCED POLYMER BY SUPERCRITICAL FLUID TREATMENT

Attorney Docket No.: FMC 1289 PUS / 200-0661

DECLARATION UNDER 37 C.F.R. § 1.131

Commissioner for Patents
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Ellen C. Lee, do hereby declare and state as follows:

1. I, along with the other co-inventors, conceived of and reduced to practice the invention disclosed and claimed in U.S. patent application 09/748,669 in the United States prior to February 22, 2000.

2. As evidence of this conception and reduction to practice, attached is a redacted copy of an invention disclosure showing our conception and reduction to practice of the invention in the United States prior to February 22, 2000.

3. As further evidence of this conception and reduction to practice, attached is a redacted copy of an XRD log book. The last three entries on the first page of the log book and the entries on the second page of the log book are pertinent. Of

special note are the last two entries on the second page of the log book. These correspond to the Example in the '669 application.

4. Applicants therefore respectfully submit that the Japanese reference (JP 2000-053871 to Toru) is not a proper reference against the subject claims.

I hereby declare that all statements made herein are of my own knowledge and are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

8/15/2003
Date

Ellen Lee

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Invention Disclosure Number: 17141
Creation Date:
Author: ELEE9

Section 1: INVENTION DESCRIPTION

Title of Inventions: A MEANS OF PROCESSING A THERMOPLASTIC NANOCOMPOSITE MATERIAL WITH A SUPERCRITICAL FLUID IN ORDER TO ACHIEVE GOOD FILLER DISPERSION

Patent Evaluation Committee: BODY
CPSC Code: 01.00.00
Originating Country Code: US
Internal Reference Number: None
Company: FORD

Section 2: PROBLEM & SOLUTION

Identify the purpose/function of the new technology(s) of the invention and advantages over prior technology: Reinforcement of thermoplastics with fillers can result in materials with greatly increased mechanical properties. Thermoplastics are often too viscous to allow uniform dispersion of fillers. Furthermore, reinforcement by nanoscale clays requires good exfoliation of layered platelet structure. Our discovery allows good exfoliation, particle distribution, and dispersion of fillers within a thermoplastic matrix by processing with a supercritical fluid.

Attachments: See Section:9 ATTACHMENTS

Section 3: PRIOR ART

Identify the closest technology, if any, of which you are aware: Toyota's in situ polymerization of nylon nanocomposties, Mucell foam technology, supercritical drying

Attachments: See Section:9 ATTACHMENTS

Section 4: DETAILED DESCRIPTION

Please provide a full and complete description of the invention: Reinforcement of thermoplastics with fillers (glass, layered silicates, talc, etc.) can result in materials with greatly increased mechanical properties.

Thermoplastics, however, are often too viscous to allow uniform dispersion and diestribution of fillers. Furthermore, reinforcement by nanoscale clays (layered silicates, phyllosilicates, montmorillonite, etc.) requires good exfoliation or delamination of layered platelet structure. Our discovery allows good platelet exfoliation, particle distribution, and despersion of fillers within a thermoplastic matrix by processing the mixture in situ with a supercritical fluid (SCF) such as supercritical CO2. Thermoplastic resin (polypropylene, nylon, etc.) is added to an extruder/injection molder with a desired amount of filler and CO2 or other supercritical fluid. The polymer, swollen with SCF, undergoes a dramatic reduction in viscosity, which allows good filler dispersion. Layered silicate fillers can also be pretreated by SCF processing to obtain a card-house structure prior to addition. The filled thermplastic (nanocomposite) may undergo slow or fast depressurization, and may result in a foamed material upon exiting extruder/injection molder.

Attachment: See Section:9 ATTACHMENTS

Section 5: DATES

First Recorded Description of Invention: E.C. Lee notebook – idea was recorded) first XRD scan was run on samples : XRD on clay nanocomposite (melt mixed with pretreated clay)

Completed/Anticipated Completion Date of Working Model or Demonstrated Result:

Planned/Anticipated First Production Use:

Planned Usage:

Section 6: CATEGORY QUESTIONS

Invention Category: Process

Category Questions do not exist or not answered.

Rahaman	PDC.ZR1(4wt%P/DSC I)/1150C/redox/700C normal slits: 40mA/45kV powder/ethanol on new $SrTiO_3$		X2GWG651
"	(") + 90° rotation	"	X2GWG652
"	(") + remove 0.5mm slit	"	X2GWG653
A. Drews	radiator fin piece from K. Lazarz, self supported 13°-65°/0.25°/2sec normal slits 45kV 40mA		.MDX2.004
S. Fennell	$(CeZr)O_2$ L-990828 For Y. Cheng slits: 2.38 → 1-0.3 CuKα 40mA 45kV cont scan 1°/in 5°-90° 0.03 chopper		saf X2001
S. Fennell	$(Zr,Ce)O_2$ ZC80201 - m_{ZrO_2}/m_{CeO_2} = 80/20 For Y. Cheng. Same conditions as saf X2001		saf X2002
ECLee	untreated clay (INSH) I-30E Nanocor slits: 0.48 → 0.2, 0.1 1.5°-15°; 0.03°; step; 3 sec ct time 45kV 40mA (vaseline on ZBH)		ECL X2024
ECLee	same as above; per ct. time 4s (vaseline on ZBH)	"	ECL X2025
ECLee	supercritical CO_2 treated I-30E (1700psi, 80°C, 5h) same conditions as ECL X2024. (vaseline on ZBH)	"	ECL X2026

USER	DESCRIPTION	DATE	FILENAME
EClee	supercritical CO_2 / PDMS (~~2000 psi~~) treated clay		
	20wt% PDMS / 80% clay, excess PDMS vented w/ CO_2		ECLX2027
	same cond. as ECLX2024 (vaseline on ZBO)		
Eclee	untreated I-30E on ZBO (no vaseline)		ECLX2028
	same cond. as ECLX2024		
Eclee	supercritical CO_2 / PDMS treated clay (same sample	"	ECLX2029
	as ECLX2027) on ZBO		
	same conditions as ECLX2024		
EClee	supercritical CO_2 treated I-30E (same sample as ECLX2028)	"	ECLX2030
	on ZBO		
	Same cond. as ECLX2024		
A. Drews	ultrasonically removed fluoride crystals from aged		4BDX2.005
	radiated film, then filtered (.45 μm)		
	5°-90°/.025°/2sec 45kV 40mA		
	suspension deposited on ZBO		
Eclee	5% $scCO_2$/PDMS/clay - PP523 microtomed on ZBO		ECLX2031
	1.5°-15°; 0.03°; step; 3 sec		
	~~normal slits~~ slits: 0.4° → 0.2, 0.1		
	45kV 40mA		
EClee	5% $scCO_2$ clay + 10% PB & CS23 microtomed on ZBO		ECLX2032
	same as above		